The Termination Clause as a Sequential Screening Device

Renkun Yang

Department of Economics
The Ohio State University

August 29, 2022
Mergers & Acquisitions Deals

Traditional Practices

- Negotiation
  - Buyer
  - Seller

- Auction
  - Buyers
  - Seller
Mergers & Acquisitions Deals

Go-shop Provision

INITIAL BUYER

offer

SELLER

termination fee

better offer

INITIAL BUYER

THIRD PARTY
Mergers & Acquisitions Deals
Go-shop Provision

- **2009 Sep**: 3 firms approach CKE
- **2010 Feb**: Agreement with Thomas H. Lee at $11.05 per share
  - CKE solicits 28 buyers
- **Apr**: Apollo wins at $12.55 per share
  - Thomas H. Lee gets termination fee $9M
Mergers & Acquisitions Deals

Go-shop Provision

- **2009**
  - Sep: 3 firms approach CKE

- **2010**
  - Feb: Agreement with Thomas H. Lee at $11.05 per share
    - CKE solicits 28 buyers
  - Apr: Apollo wins at $12.55 per share
  - Thomas H. Lee gets termination fee $9M
Mergers & Acquisitions Deals
Go-shop Provision

2009
Sep
3 firms approach CKE

2010
Feb
Agreement with Thomas H. Lee at $11.05 per share

CKE solicits 28 buyers

Apr
Apollo wins at $12.55 per share

Thomas H. Lee gets termination fee $9M
Cineworld wins
Regal solicits 47 buyers

2018 Jan Cineworld wins

2017 Nov Regal meets Cineworld
Agreement: $23 per share termination fee $75m

Mar Deal finished at $23 per share
Question

Why the emergence of go-shop deals?
1986: Delaware Court setting the *Revlon duty* principle

The duty of the board had thus changed ... to the maximization of the company’s value at a sale for the stockholders’ benefit.

Controversy

1. Skepticism: favored bidder $\Rightarrow$ deterring competition

   Generally the business people want to get the transaction done, to happen, and they want it to happen with the partner they’ve picked.

   Richard I. Beattie, Chairman, Simpson Thacher & Bartlett

2. Support: positively related to premium

1. Skepticism: favored bidder $\Rightarrow$ deterring competition

   Generally the business people want to get the transaction done, to happen, and they want it to happen with the partner they’ve picked.

   __________________________________________________________________________

   Richard I. Beattie, Chairman, Simpson Thacher & Bartlett

2. Support: positively related to premium

A theoretical rationale of go-shop provisions:

when the buyer faces uncertainty prior to contracting

- initial estimate is noisy
- more documents provided after the confidential agreement

Go-shop benefits the seller via **sequential screening**

- **Sequential benefit**: pricing in expectation
- **Screening benefit**: tailoring offers
- **Competition**: open to competition albeit favoring buyer one
Sequential benefit: pricing in expectation

Buyer final value $\nu \sim U[0,1]$; Seller charges $p = 0.5$
Preview of Results

Screening benefit:

It’s feasible: buyer’s contract selection

- optimistic buyer: secure the target (high contract)
- pessimistic buyer: wait and see (low contract)

It’s beneficial: tailoring offers

- optimistic buyer: charge high price (high contract)
- pessimistic buyer: introduce more competition (low contract)
Preview of Results

Screening benefit:

It’s feasible: buyer’s contract selection

- optimistic buyer: secure the target (high contract)
- pessimistic buyer: wait and see (low contract)

It’s beneficial: tailoring offers

- optimistic buyer: charge high price (high contract)
- pessimistic buyer: introduce more competition (low contract)
Compared to other mechanisms, a go-shop provision is

- always better than an auction without a reserve price
- better than a static auction with an optimal reserve price when the buyer’s initial estimate is noisy
- close to full optimum when the buyer’s initial estimate is noisy
Related Literature

Entry efficiency

Sequential negotiation: Fishman (1988), Bulow and Klemperer (2009), Roberts and Sweeting (2013), etc.

Strategic ex ante contract

Rent extraction via pre-contracting: Hua (2007), Che and Lewis (2007), Choi (2009), etc.

Sequential Screening

Optimal dynamic mechanism: Courty and Li (2001), Eso and Szentes (2007), Pavan et al. (2014), etc.
Real market practice: Nocke et al. (2012), Ely et al. (2017)
Entry efficiency

This paper adds:

a **complementary rationale** for go-shop provisions

Strategic ex ante contract

Rent extraction via pre-contracting: Hua (2007), Che and Lewis (2007), Choi (2009), etc.

Sequential Screening

Optimal dynamic mechanism: Courty and Li (2001), Eso and Szentes (2007), Pavan et al. (2014), etc.

Real market practice: Nocke et al. (2012), Ely et al. (2017)
Entry efficiency

This paper adds:

a complementary rationale for go-shop provisions

Strategic ex ante contract

This paper adds:

a more general information structure

Sequential Screening

Optimal dynamic mechanism: Courty and Li (2001), Eso and Szentes (2007), Pavan et al. (2014), etc.

Real market practice: Nocke et al. (2012), Ely et al. (2017)
Related Literature

Entry efficiency

This paper adds:

a complementary rationale for go-shop provisions

Strategic ex ante contract

This paper adds:

a more general information structure

Sequential Screening

This paper adds:

a real world application and simple approximation
Model
$B_1$ arrives with type $\tau$

$S$ announces menu

$\{b(\tau), f(\tau)\}_\tau$

Agreement $\tau$ (public)

$B_2$ arrives

Both learn values $v_1, v_2$

Modified Auction

$S$ reveals confidential documents
Model

\( B1 \) arrives with type \( \tau \)

\( B2 \) arrives

Both learn values \( v_1, v_2 \)

Agreement \( \tau \) (public)

Modified Auction

\( S \) reveals confidential documents

\( S \) announces menu

\( \{b(\tau), f(\tau)\}_\tau \)

Final valuation \( v_i \): Initial type (estimate) \( \tau \):

- \( \tau \sim F \) on \([\underline{\tau}, \bar{\tau}]\), final value \( v_1|_\tau \sim G_\tau(\cdot) \)

- \( G_\tau \) ordered by FOSD: higher type is more optimistic
Model

\( B1 \) arrives with type \( \tau \)

Agreement \( \tau \) (public)

\( S \) announces menu

\( \{b(\tau), f(\tau)\}_\tau \)

\( B2 \) arrives

Both learn values \( v_1, v_2 \)

Modified Auction

\( S \) reveals confidential documents

Contract:

- \( b \): floor price promised by the initial buyer \( B1 \)
- \( f \): termination fee \( S \) pays \( B1 \) if sell to another buyer
$B_1$ arrives with type $\tau$

$S$ announces menu $\{b(\tau), f(\tau)\}_\tau$

Agreement $\tau$ (public)

Both learn values $v_1, v_2$

$B_2$ arrives

$S$ reveals confidential documents

Modified Auction
Model

- **B1**: \( \tau \sim F \) on \([\underline{\tau}, \bar{\tau}]\), final value \( v_1|_\tau \sim G_\tau(\cdot) \)
  - \( G_\tau \) ordered by FOSD: higher type is more optimistic
- **B2**: \( v_2 \sim H(\cdot) \), indep of \( \tau, v_1 \)
Model

$B_1$ arrives with type $\tau$

$S$ announces menu

$\{b(\tau), f(\tau)\}_\tau$

Agreement $\tau$ (public)

Both learn values $v_1, v_2$

$B_2$ arrives

$S$ reveals confidential documents

Modified Auction

Modified English auction:

- The bid starts from $b(\tau)$, and increases until one bidder drops
- If $B_2$ drops at $b_2$, $B_1$ wins and pays $b_2$
- If $B_1$ drops at $b_1$, $B_2$ wins and pays $b_1 + f(\tau)$, $B_1$ gets $f(\tau)$
Main Results
Lemma (Bidding Equilibrium)

Given \((b, f)\), there exists a unique weakly dominant strategy equilibrium:
\[ b_1 = \max\{v_1 - f, b\}, \quad b_2 = \max\{v_2 - f, b\}. \]

Proof.

- \(B1\) shades bid by \(f\): opportunity cost of winning is \(f\)
- \(B2\) shades bid by \(f\): paying additional \(f\) after winning
Bidding Stage: Equilibrium Allocation

Figure 1: Equilibrium allocation in the bidding stage
The seller design the go-shop contract to

\[
\max_{(b(\tau), f(\tau))} \int_{\tau}^{\bar{\tau}} R(b(\tau), f(\tau)|\tau) dF(\tau)
\]

s.t. \( [IC_{\tau}] \ E[u(b(\tau), f(\tau))|\tau] \geq E[u(b(\tau'), f(\tau'))|\tau] \ \forall \ \tau, \tau' \)

\( [IR_{\tau}] \ E[u(b(\tau), f(\tau))|\tau] \geq 0 \ \forall \ \tau \)

**Transformation:**

Let \( t(\tau) = b(\tau) + f(\tau) \) denote the “deterrence price”.

Contract \{b(\tau), f(\tau)\} is equivalent to contract \{t(\tau), f(\tau)\}\]
The seller design the go-shop contract to

\[
\max_{(b(\tau), f(\tau))} \int_\tau^{\bar{\tau}} R(b(\tau), f(\tau)|\tau) dF(\tau)
\]

s.t. \( [IC_\tau] \quad E[u(b(\tau), f(\tau)|\tau] \geq E[u(b(\tau'), f(\tau')|\tau] \quad \forall \ \tau, \tau' \)

\( [IR_\tau] \quad E[u(b(\tau), f(\tau)|\tau] \geq 0 \quad \forall \ \tau \)

Transformation:

Let \( t(\tau) = b(\tau) + f(\tau) \) denote the “deterrence price”.

Contract \( \{b(\tau), f(\tau)\} \) is equivalent to contract \( \{t(\tau), f(\tau)\} \)
Contracting Stage: Seller’s Problem

The seller designs the go-shop contract to

$$\max_{(t,f)\tau} \int_{\underline{\tau}}^{\overline{\tau}} R(t, f|\tau) dF(\tau)$$

s.t. $[IC_{\tau}] \ \forall \ \tau, \tau'$

$[IR_{\tau}] \ \forall \ \tau$

Transformation:

Let $t(\tau) = b(\tau) + f(\tau)$ denote the “deterrence price”.

Contract $\{b(\tau), f(\tau)\}$ is equivalent to contract $\{t(\tau), f(\tau)\}$
The seller designs the go-shop contract to

\[
\max_{(t,f)\tau} \int_{\tau}^{\bar{\tau}} R(t, f|\tau) dF(\tau)
\]

s.t. \([IC_\tau] \forall \tau, \tau'\) screening benefit

\([IR_\tau] \forall \tau\) sequential benefit

Transformation:

Let \(t(\tau) = b(\tau) + f(\tau)\) denote the “deterrence price”.

Contract \(\{b(\tau), f(\tau)\}\) is equivalent to contract \(\{t(\tau), f(\tau)\}\)
Contracting Stage: Incentive Compatibility

**B1** with type \( \tau \) has expected payoff

\[
U(\tau) = f + \int_{t}^{\bar{v}} H(v)[1 - G(v|\tau)] \, dv - H(t) \int_{v}^{t} G(v|\tau) \, dv
\]

**Proposition (Incentive Compatibility)**

A go-shop mechanism is IC if and only if

1. \( t(\tau) \) is increasing in \( \tau \),

2. Envelope theorem holds: \[
\frac{dU(\tau)}{d\tau} = \frac{\partial B(t(\tau)|\tau)}{\partial \tau}.
\]
Contracting Stage: Incentive Compatibility

$B1$ with type $\tau$ has expected payoff

$$U(\tau) = f + B(t|\tau)$$

Proposition (Incentive Compatibility)

A go-shop mechanism is IC if and only if

1. $t(\tau)$ is increasing in $\tau$,

2. Envelope theorem holds: \[ \frac{dU(\tau)}{d\tau} = \frac{\partial B(t(\tau)|\tau)}{\partial \tau}. \]
Contracting Stage: Incentive Compatibility

$B1$ with type $\tau$ has expected payoff

$$U(\tau) = f + B(t|\tau)$$

Proposition (Incentive Compatibility)

A go-shop mechanism is IC if and only if

1. $t(\tau)$ is increasing in $\tau$,

2. Envelope theorem holds: $\frac{dU(\tau)}{d\tau} = \frac{\partial B(t(\tau)|\tau)}{\partial \tau}$. 
Proposition

The following program solves the original seller’s problem:

\[
\max_{t(\tau)} \int_{\tau}^{\bar{\tau}} R(t(\tau)|\tau) dF(\tau)
\]

s.t. \( t(\tau) \) is increasing.
Proposition (Optimal go-shop contract: characterization)

The optimal deterrence price satisfies:

\[ E_{G(.|\tau)} [\phi_1(v_1, \tau)|v_1 < t(\tau)] = t(\tau) - \frac{1 - H(t(\tau))}{h(t(\tau))} \]  \hspace{1cm} (1)

where \( \phi_1(v_1, \tau) \) is the dynamic virtual valuation of B1:

\[ \phi_1(v_1, \tau) = v_1 + \frac{1 - F(\tau)}{f(\tau)} \frac{\partial G(v_1|\tau)/\partial \tau}{g(v_1|\tau)}. \]
Main Result

Proposition (Optimal go-shop contract: characterization)

The optimal deterrence price satisfies:

\[ E_{G(\cdot|\tau)}[\phi_1(v_1,\tau) | v_1 < t(\tau)] = t(\tau) - \frac{1 - H(t(\tau))}{h(t(\tau))} \]

\[ \underbrace{\text{MB of raising } t}_{\text{MC of raising } t} \]
Figure 2: Equilibrium allocation in the bidding stage
Main Result: Intuition

Figure 2: Equilibrium allocation in the bidding stage

\[ t + dt \]

\[ t \]

\[ t - \frac{1 - H(t)}{h(t)} : MC \]
Main Result: Intuition

Figure 2: Equilibrium allocation in the bidding stage
Go-shop vs. Static Auction
Go-shop vs. Optimal Static Auction $G = H$

![Graph showing the comparison between Go-shop and Optimal Static Auction](image-url)
Proposition (no \textit{ex post} information)

When $\tau = v_1$, \textit{optimal go-shop} $\leq_{rev}$ \textit{optimal static auction}.

Proof sketch:

1. When $\tau = v$, $t^*(\tau) \equiv t^*(v) = v$.

2. Optimal go-shop $=_{rev}$ ordinary auction $\leq_{rev}$ optimal auction.
Proposition (no ex post information)

When $\tau = v_1$, optimal go-shop $\leq_{rev}$ optimal static auction.

Proof sketch:

1. When $\tau = v$, $t^*(\tau) \equiv t^*(v) = v$.

2. Optimal go-shop $=_{rev}$ ordinary auction $\leq_{rev}$ optimal auction.
Proposition (no ex ante information)

When \( \tau \) is a singleton, optimal go-shop \( \geq_{rev} \) optimal static auction.

Proof sketch:

1. Optimal go-shop with \( t^* \geq \) go-shop with \( t = r^* \): obvious.

2. Go-shop with \( t = r^* \geq \) static auction with \( r^* \): B1’s IR
Proposition (no ex ante information)

*When* $\tau$ *is a singleton, optimal go-shop* $\succeq_{rev}$ *optimal static auction.*

**Proof sketch:**

1. Optimal go-shop with $t^* \geq$ go-shop with $t = r^*$: obvious.

2. Go-shop with $t = r^* \geq$ static auction with $r^*$: B1’s IR
Go-shop vs. Optimal Static Auction $G = H$

What happens in between?

- Optimal go-shop
- Optimal static auction
- Static auction w/o reserve price

Revenue vs. Informativeness of $\tau$
Go-shop vs. Optimal Static Auction $G = H$

What happens in between?

**Lemma**

Assume $G(v|\tau)$ is parametrized by $a$, and $\frac{\partial^2 G(v|\tau,a)}{\partial \tau \partial a} \leq 0$ \forall \tau, a, v, then the revenue from optimal go-shop decreases in $a$.

**Proposition (general informativeness)**

There exist an $a^*$ such that $R_G \geq R_S$ if and only if $a \leq a^*$.
What happens in between?

**Lemma**

Assume $G(v|\tau)$ is parametrized by $a$, and $\frac{\partial^2 G(v|\tau,a)}{\partial \tau \partial a} \leq 0 \ \forall \tau, a, v$, then the revenue from optimal go-shop decreases in $a$.

**Proposition (general informativeness)**

There exist an $a^*$ such that $R_G \geq R_S$ if and only if $a \leq a^*$.
Go-shop vs. Fully Optimal Dynamic Dynamic Mechanism
Optimal Allocation Rule

Optimal go-shop provision

Allocation based on \( E[\phi_1(v_1, \tau) | v_1 < t] = t - \frac{1 - H(t)}{h(t)} \)

Optimal dynamic mechanism (second best)

Allocation based on \( \phi_1(v_1, \tau) \geq v_2 - \frac{1 - H(v_2)}{h(v_2)} \)
A Binary-continuous example:

\[ \tau_1 \in \{h, l\} \text{ with equal probability} \]

\[ G_l(v_1) = v_1, \quad G_h(v_1) = v_1^2, \quad H(v_2) = v_2 \text{ over } [0, 1] \]

Figure 3: PDF of value \( v_1 \) when type \( \tau \) is (a) low (b) high
Optimal Allocation Rule

(a) go-shop ($\tau = h$)  
(b) go-shop ($\tau = l$)  
(c) optimal ($\tau = h$)  
(d) optimal ($\tau = l$)
Numerical Results: Binary $\tau$

(a) $G_h(v) = v^a, G_l(v) = v^{1/a}$

(b) $G_h(v) = v^b, G_l(v) = v$

Figure 4: Revenue comparison when (a) $a$ ranges from uninformative to informative; (b) informativeness is bounded
Takeaways

Fulfilling *Revlon Duty*? Potentially Yes!

How? Sequential screening + competition

When? Initial estimate is noisy
The insights can be extended to:

1. Other markets: CEO compensation Spears and Wang (2005, JET)

2. Other (combinations of) deal protection devices: toeholds, matching rights, right of first offer/refusal, etc.

Open questions

1. Just one aspect: IPV, no entry cost, sequential screening role, etc.

2. A real acquisition involves: agency problem, entry/bidding/initiation/solicitation costs, common and private value components, reverse/bifurcated termination fees, buyer bargaining power, etc.
The insights can be extended to:

1. Other markets: CEO compensation Spears and Wang (2005, JET)

2. Other (combinations of) deal protection devices: toeholds, matching rights, right of first offer/refusal, etc.

Open questions

1. Just one aspect: IPV, no entry cost, sequential screening role, etc.

2. A real acquisition involves: agency problem, entry/bidding/initiation/solicitation costs, common and private value components, reverse/bifurcated termination fees, buyer bargaining power, etc.
Thanks!
A Binary-continuous example:

\[ \tau_1 \in \{h, l\} \text{ with equal probability} \]

\[ G_l(v_1) = v_1, \quad G_h(v_1) = v_1^2 \text{ over } [0, 1] \]

**Figure 5:** PDF of value \( v_1 \) when type \( \tau \) is (a) low (b) high